UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 2

DATE: March 12, 2013

SUBJECT: EPCRA 313 Data Quality Inspection
Summary of Findings

Paulsboro Refining Company
800 Billingsport Rd., NJ 08066

FROM: Nora Lopez, TRI Coordinator
Toxics Section

Luz Garcia, Physical Scientist
Toxics Section

TO: John Gorman, Branch Chief
Toxic Substances Section

On June 6, 2012, an EPCRA Section 313 inspection was conducted at Paulsboro Refining Company located at 800 Billingsport Rd. NJ 08066. This "for cause" data quality inspection was conducted because PRC reported to the 2010 Toxic Release Inventory (TRI) database a large increase in water emissions when compared to the 2009 TRI water emissions. An arrangement for the inspection was conducted with Mr. John Deemer, Environmental Manager on May 17, 2012. On May 29, 2012 we sent Mr. Demmer a letter confirming the inspection that included a list of questions that would be covered during the inspection (Attachment 1).

On June 6, 2012 we met with Mr. Deemer and Ms. Sophia Li, Senior Environmental Engineer. Ms. Luz V Garcia, US EPA Region 2, was the co-inspector and Mr. Carey Johnston EPA OECA also was present. After explaining the purpose of the inspection, we presented our credentials and issued the Notice of Inspection, which Mr. Demmer signed (Attachment 2).

Subsequent to our inspection, PRC provided responses to all the questions that we covered during the inspection and subsequent inquiries to ascertain if PRC was in compliance with EPCRA 313 (see attached inspection report). The following is a summary of the findings for the inspection:

- PRC seemed to have reported TRI reports for chemicals stored or used at the facility.

- PRC provided reasonable responses to increases and decreases of emissions for the chemicals in above questions **except for nitrate compounds:**

    - PRC manufactures nitrate compounds at the WWTP.
    - Facility manufactured: 400,648 pounds in 2008, 223,421 pounds in 2009, 335,052 pounds in 2010 (Table 7 Attachment 5).
    - PRC was previously known as Valero Refining. On December 17, 2010 the facility became Paulsboro Refining LLC (Attachment 3.1 - Environmental Agreement – submitted to EPA October 25, 2013)
    - Valero Refining ("VR") reported that they emitted 90,469 lbs of nitrate compounds in 2008 and 50,450 lbs of nitrate compounds in 2009.

- PRC indicates in the their response that in 2009 and previous years the nitrate compound releases via the WWTP were calculated and reported as nitrogen (molecular weight of 14) vs. nitrate (a molecular weight of 62).
- Based on the information provided by PRC, VR should have reported that they emitted 400,648 lbs in 2008 and 223,421lbs in 2009.
- PRC or VR did not correct TRI Forms R reports for 2008 and 2009.
- Correct TRI emissions calculated should have been as follows.

Year	Nitrate Compounds TRI Reported Emissions (lbs)	Nitrate Compounds TRI Correct Emissions (lbs)
2008	**90,469**	**400,648**
2009	**50,450**	**223,421**
2010	**335,052**	**333,052**

- PRC revised TRI data for 2008 and 2009 to reflect correct emissions.
- Based on the information provided by PRC, VR should have reported that they emitted 400,648 lbs in 2008 and 223,421lbs in 2009.
- VR or PRC failed to submit information as per **EPCRA §372.85(b)(2)** - "the submitted information is true and complete and that amounts and values in this report are accurate based upon reasonable estimates using data available to the preparer" (**Ref: 42 USC §11023(g)(B)** – "include an appropriate certification, signed by a senior official with management responsibility for the person or persons completing the report, regarding the accuracy and completeness of the report").

In addition, we found that there have been many changes in methodology for estimation methods at the facility, some due to new EPA methodologies and different estimation software used by VR and PRC. We recommend that PRC should keep track of changes in estimations techniques within the different spreadsheets used to summarize TRI reported releases.

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800 Billingsport Rd., NJ 08066

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Toxics Section

Luz Garcia, Physical Scientist
Toxics Section

TO: John Gorman, Chief
Pesticides and Toxic Substances Section

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General Information:

Paulsboro Refining LLC (PRC) was previously known as Valero Refining, which had purchased the facility from Exxon in 1998. Refinery operations at the site date back to 1917. No significant structures or equipment remains from that time. It is located in around 950 acres along the Delaware River in Greenwich Township.

On December 17, 2010 the facility became Paulsboro Refining LLC (Attachment 3.1 - Environmental Agreement – submitted to EPA October 25, 2013). It is a private company owned by PBF Holding Company LLC (an equity firm) which also owns Toledo Refining and Delaware Refining. Each refinery is a a limited liability company (LLC). PRC has a capacity to process around 170,000 bbl/day of crude, but presently it is processing around 130,000 bbl/day. In calendar year 2010 the total product volume was 55,458,281 barrels. The facility has approximately 400 employees, in 2 shifts per day and operates 24 hours daily, 365 days a year. The facility ships its products by pipeline, barge, tanker, rail and truck. Main products are lube oil base stocks, LPG's, gasolines, mid- distillate products, asphalt, petroleum coke and molten sulfur. PRC's CEO is Thomas Nimbly and their headquarters are located in Parsippany, NJ.

We proceeded to review PRC's manufacturing activities. Mr. Deemer provided us with a refinery overview and associated processes document that details information (Attachment 3). In addition, we reviewed the major processes at the facility. The following summarizes the information provided:

PRC major units include two crude distillation units, vacuum distillation units, an FCC unit, a delayed coking unit, a lube oil processing unit, a distillate hydrotreater, reformer, alkylating unit and a propane deasphalting unit. The PRC refinery processes a variety of medium and to heavy sour crudes oils and predominantly produces gasoline, heating oil and aviation jet fuel. The refinery also manufactures lubricant base oils. In addition, PRC produces asphalt and petroleum coke.

Crude is sent to either Units 6 or 7 distillation towers in which they produce light end products like kerosene, and diesel. These fractions are sent to Hydrotreater Units for removal of sulfur and nitrogen., producing jet fuel and distillates.

Some of the light fractions and most of the heavy fractions are sent to:

- Vaccum distillation MBPD Unit
- Lube Pressing Units, which consist of:
    - Furfural (use of furfural to to remove unwanted, mainly aromatics from lubricating oil stock or diesel stock)
    - Dewaxing Units (remove the heavy waxy constituents in petrolatum from vacuum distillation products). PRC uses a "Mobil Lube Dewaxing" unit.
- Hydrotreaters for removal of sulfur and nitrogen
- Catalytic reformer unit is used to convert the naphtha-boiling range molecules into higher octane reformate (reformer product)
- FCC (fluid catalytic cracking) Unit which upgrades heavier fractions into lighter, more valuable products like gasoline and propylene
- Alkylation unit in which olefins reacts with isobutene to form isooctane
- Coker Unit: heavy residual is thermally cracked to produce coke
- Propane De-asphalting Unit which produces asphalt

The facility has also has two sulfur recovery units in which all sulfur from the wastewater and Hydrotreating Unit is recovered by a Claus process.

The wastewater treatment plant process consists of: wastewater going through API separators (oil/water separator), DAF unit (dilution attenuation unit), activation unit, aeration basins, clarifiers, sand filtration and then chlorination. Solids removed are sent to the Coker which is a patented technology allowed under RCRA. The API and DAF solids also go to the Coker. They have storm water retention ponds and the effluent is treated in the wastewater treatment plant, however in cases of extreme weather conditions it is discharge directly to the Delaware River. Treated effluent discharged to the Delaware River.

We reviewed the questions developed and obtained additional information after the inspection to appropriately address responses. The following are the responses and EPA's comments/findings:

1. **Please provide the latest NJRTK that was provided to the Local Emergency Planning Committee (LEPC).**

   PRC Response: This was provided during the inspection (Attachment 4).

   EPA Comment: PRC provided the NJRTK Survey DEQ100 form which includes chemicals stored at the facility. This list was reviewed after the inspection and compared to the reported

EPCRA 313 chemicals. The following chemicals that were found that were reported as stored but that we could not identify a reported EPCRA 313 Report are as follows:

- aluminum oxide (fibrous forms) (various locations)
- Antimony (batteries and REI Bldg)
- bromotrifluromethane (fixed fire suppression)
- chlorodifluoromethane (HVAC)
- ethylene glycol (various locations)
- glycol ethers (TBA, fire station)
- manganese oxide (various locations)
- propylene glycol (warehouse, fire station)

The following chemicals have trade names and we could not identify if they contain EPCRA 313 regulated chemicals:

- *3D Trasar 3DT191 (cooling towers)*
- *3D Trasar 3DT197 (cooling towers)*
- *Citra Clean Degreaser (Refinery wide)*
- *CTI 120 (various locations)*
- *Nalco EC1495A (crude units)*
- *Sulfa check EC9085A(Nalco)*
- *Super Desox (FCC Catalyst)*

On October 4, 2012 we e-mailed Mr. Deemer with a request (Attachment 7 e-mail) to provide additional information on the following chemicals: aluminum oxide (fibrous forms) (various locations) and manganese oxide (various locations). In addition we requested the MSDS on the trade name chemicals with amounts manufactured, processed or otherwise used for calendar year 2011, 2010 and 2009. On December 6, 2012 we received responses to our request with copies of the MSDS (Attachment 6). The following details their responses and TRI reporting requirements if any:

Aluminum oxide (fibrous forms) - PRC indicated in their response that the online 2011 Community Right to Know Survey (CRTKS) defaults to fibrous forms of the chemical however the type of catalyst and aluminum drying media are in powder, granule or pellet forms and therefore not subject to reporting requirements. They provided MSDS for KF-757. MSDS for KF-757 confirms that the aluminum oxide form contained in this product is not regulated by TRI.

Manganese oxide (various locations) - PRC indicated that they had a typographic error in 2011 CRTK reporting and instead they use magnesium oxide.

In regard to the trade name chemicals, PRC provided MSDS. The following provides a summary of their review:

MSDS	TRI chemicals	Filed for TRI Chemical
3D Trasar 3DT191 (cooling towers)	No TRI Chemicals	-
3D Trasar 3DT197 (cooling towers)	No TRI Chemicals	-
Citra Clean Degreaser (Refinery wide)	No TRI Chemicals	-
CTI 120 (various locations)	No TRI Chemicals	-
Nalco EC1495A (crude units)	No TRI Chemicals	-
sulfa check EC9085A(Nalco)	No TRI Chemicals	-
Super Desox (FCC Catalyst)	Magnesium vanadate <5%;	Yes (vanadium compounds)

Based on the above information the only chemical for which they needed to include in threshold determinations was for the Super Desox which contains magnesium vanadate, a vanadium compound. PRC did file for vanadium compounds.

2. **Please make sure that Material Safety Data Sheets are available for review during the inspection.**

   PRC Response: They indicated that their MSDS system is online (supported by 3E Company) and that if we needed any MSDS they could retrieve them.

   EPA Comment: On October 4, 2012 we sent an e-mail (Attachment 7 emails) requesting MSDS for the trade names on question number 1. On December 6, 2012 we received responses to our request with copies of the MSDS (Attachment 6). See above question 1 for review of MSDS's.

3. **Please provide a description of your process and activities conducted at your facility, including the following:**
   - **General description of your petroleum refining process**

     PRC Response: Description was provided in Appendix B of Attachment 5. It also included a schematic of the waste treatment plant (Appendix C) and a plot plan of the refinery in Appendix D.

   - **Tracking of different raw materials that are processed and incorporated into your final product.**

     PRC Response: Facility tracks crude oil and purchased gas oil with a program called Aspen Operations Yield Accounting Package. The system tracks on a real time basis and provides details on process flow information between the different units and storage tanks that evaluates performance of units.

   - **Tracking the different chemicals that are "otherwise used" (not incorporated into the final product).**

     PRC Response: Chemical purchases are tracked with a Systems Applications and Products Software (SAP). Changes on chemical purchased follow a MOC procedure (Management of Change) every Tuesday with which alerts are generated. Mr. Demmer indicated that once

the facility was bought by PRC they have done a lot of changes in chemical vendors.

- **Tracking of TRI chemicals that are "manufactured"**

  PRC Response: For TRI chemicals manufactured the thresholds are calculated via mass balance using beginning and ending inventories, quantities shipped offsite, quantities consumed off-site, quantities destroyed onsite and releases

- **Type of monitoring or testing the facility undertakes on a quarterly, yearly or monthly basis for determination of compliance EPCRA 313 – Toxic Release Inventory requirements, if any.**

  PRC Response: Thresholds are based on data from production and release is obtained via monitoring or testing performed for existing environmental programs. Mr. Demmer indicated that they used TANKS, however when this facility used to be Valero they used VALAIR which was based on emission factors developed by Valero.

- **Type of monitoring done at the facility under other federal and state environmental statutes that is used to provide emission information under EPCRA 313 – Toxic Release Inventory requirements.**

  PRC Response: They presently use existing monitoring analysis from other environmental programs to calculate and provide emissions to TRI (NPDES, CMS, point air source testing, LDR, Title V permit VOC's sewer testing, NESHAPS and RCRA information).

4. **Please provide detailed description of tracking procedure for determination of regulatory requirements under EPCRA 313 - Toxic Release Inventory.**

   PRC Response: Spreadsheets are used to compile data from various monitoring testing and emissions estimate databases.

5. **Please provide a schematic of your facility with identification of environmental controls.**

   PRC Response: Provided (Attachment 5).

<u>Material Usage/Generation Questions:</u>

1. **Please provide the following:**
   - **Crude oil sources and quantities processed for RY 2010**

     PRC Response: Table 1 (Attachment 5).

     EPA Comment: Table 1 indicates that for 2010 they had 48,848,657 barrels of crude. The largest amount of crude processed is called Arab Light with 22,684,322 barrels.

   - **List of refinery products produced (with quantities) for RY 2010**

     PRC Response: Table 2 (Attachment 5)

EPA Comment: The largest amount of product produced was gasoline with a total 22,190,289 barrels. Distillates were 21,972,839 barrels of which 65% was fuel oil #2.

- **List of chemicals that are used (with quantities) to assist the process for RY 2010. For example chemicals used in desalting, cracking, coking, alkylation, solvent extractions, chemical treating, dewaxing, de-asphalting, boilers, gas treatment, sulfur treatment or recovery, heat exchanger cleaning, blowdown systems, cooling towers, etc.**

  PRC Response: PRC provided a list of additives (Attachment 5).

  EPA Comment: List of additives included the following chemicals: methanol, hydrogen fluoride, diethanolamine, ethylene glycol, and perchloroethylene (tetrachloroethylene). All these chemicals were reported for in RY2010. For 2011 the only chemicals not reported were percholorethylene (tetrachloroethylene) and ethylene glycol.

  In addition, PRC indicated the use of the following chemicals over 50,000 pounds a year: Nalco 3DT-192, Nalco N7330, Nalco EC2452A, Nalco EC3051A, Nalco EC5375A, Infineum R-511 (Nalco Y302028), Nalco 5403 and CTI 220.

  On October 4, 2012 we e-mailed Mr. Deemer a request (Attachment 7- emails) for MSDS for these chemicals and chemical usages for 2011 for percholorethylene (tetrachloroethylene). On December 6, 2012 we received PRC Response to our request with copies of the MSDS (Attachment 6).

  For perchloroethylene PRC indicated that in 2009 they were over threshold (26,600 pounds) while in 2010 and 2011 they were not (16,100 pounds and 7,000 pounds respectively). Therefore facility was not subject to reporting for perchlorothylene for 2009 and 2010.

  For the chemicals used over 50,000 pounds a year they provided MSDS's and the following summarizes TRI chemical information in these:

MSDS	TRI chemicals	Filed for TRI Chemical
Nalco 3DT-192	Sulfuric acid 1-5%	Yes
Nalco N7330	magnesium nitrate 1-5%	yes (nitrate compounds)
Nalco EC2452A	Napthalene 1-5 %; 124 trimethylbenzene 1-5%	yes; yes
Nalco EC3051A	Napthalene 5 - 10 %; 124-trimethylbenzene 1 - 5%	yes; yes
Nalco EC5375A	Naphthalene 5- 10%; vinyl acetate 0.1 to 1.0%	Yes; No
Infineum R-511 (Nalco Y302028),	Napthalene 1-5%; 124-trimethylbenzene 3-4%	Yes; yes
Nalco 5403	Napthalene 1-5%; 124-trimethylbenzene 1-5%	Yes; Yes
CTI 220.	Napthalene <4%; 124-trimethylbenzene <1%	Yes; below diminimis

Vinyl acetate is above demiminis (0.1-1.0%) in Nalco EC5372A which is a "distillate flow improver" as per MSDS provided. Facility indicated that it is used 421,281 pounds in 2010. This chemical once added becomes part of the end product and therefore it is processed; TRI threshold is 25,000 lbs per year. Facility processed 21,064 lbs (using 5% average) and is therefore below threshold for TRI reporting.

- **List of additives to fuels (with quantities) for RY 2010**

  PRC Response: See above.
  EPA Comment: See above comments.

- **List chemicals used as catalysts (with quantities) for RY 2010**

  PRC Response: They provided the quantities of catalysts used in 2010 (Attachment 4 table 4). The catalyst used the most was CHD1KF-757 (126,758 pounds) while others were used between 17,000 pounds to 2,000 pounds.

  EPA Comment: On October 4, 2012 we e-mailed Mr. Deemer a request (Attachment 7 - emails) for MSDS for these chemicals. On December 6, 2012 we received responses to our request with copies of the MSDS (Attachment 6).

  The following details TRI information for catalysts:

MSDS	TRI chemicals	Filed for TRI Chemical
CHD1/KF-757	molybdenum trioxide >20%; cobalt (ii) 1-10%	Yes; 2010 no for cobalt
CHD1/KF-767	No TRI Chemicals	
NHT/KF-901/905	Nickel Oxide 6%; molybdenum trioxide 30%; cobalt II 6%	yes; yes; yes 2010 no report for cobalt
NHT/KF-841.	nickel oxide 7%; molybdenum trioxide 40%	yes; yes

PRC did not file for cobalt compounds for 2010; PRC did file for nickel compounds and molybdenum trioxide. Table 4 (Attachment 4) indicated that they used 126,728 pounds of KF-757 and 17,004 pounds of KF901/905 in 2010. Based on the information provided if we use the mid range in each MSDS we find that they used less than 10,000 lbs otherwise use for cobalt compounds and therefore not required to report:

MSDS	% Cobalt	Amount Used Lbs. (Table 4)	Amount of Cobalt used Lbs
CHD1/KF-757	5%	126,728	6,336
NHT/KF-901/905	3%	17,004	510
Total Cobalt Otherwise Used			6,846

- **List of chemicals used to treat wastes or wastewater (with quantities), such as coagulants or flocculants for RY 2010**

  PRC Response: No hazardous waste treatment is conducted at the facility. The wastewater treatment chemicals consists of: CAT-FLOC 8799, NALCO 7473, Nalco Ultrion 8186, sodium hydroxide and sulfuric acid,

  EPA Comment: On October 4, 2012 we requested MSDS (Attachment 5) for these chemicals and chemical usages for 2011 for CAT-FLOC 8799, NALCO 7473, and Nalco Ultrion 8186. On December 6, 2012 we received responses to our request with copies of the MSDS (Attachment 6). A review of the MSDS showed that these chemicals used in wastewater treatment did not contain EPCRA 313 chemicals.

- **List of types of waste (non hazardous and hazardous) that the operation produces and how the waste is handled**

  PRC Response: Information was provided (Attachment 5; Tables 5 and 6), as well as BRS RCRA submission for 2011(Attachment 5; Appendix F).

  EPA Comment: A review of BRS 2011 indicates that the largest amount of waste was for:
  - spent hydrotreating catalysts 995,947 pounds
  - hazardous waste from various activities 859,560 pounds
  - spent sandblast media 89220 pounds
  - tank bottoms 740860 pounds
  - corrosive waste 61500

  On October 4, 2012 we e-mailed Mr. Deemer a request (Attachment 7-emails) for additional information on the spent hydrotreating catalysts to verify off site transfers information for TRI. On December 6, 2012 we received a response (Attachment 6) indicating that: for 2011 cobalt compounds 5,665 lbs was sent to TRICAT and 9,543bs to Eurecat, for a total of 15,208 lbs; for molybdenum compounds 22,415 lbs was sent to TRICAT and 40,735 lbs to Eurecat for a total of 63,150 pounds. This gives us a relationship that for every pound of molybdenum trioxide shipped they would also ship 0.23 pound of cobalt compounds.

  In 2010, they only shipped 28,485 pounds of molybdenum trioxide to Gulf Chemical and Metallurgical (see below). Therefore using the previous relationship (0.23 pounds of cobalt compounds per 1 pound of molybdenum compounds) we can approximately calculate how many pounds of cobalt compounds they should have sent off- site and therefore otherwise used in 2010. For 2010, around 6551 pounds of cobalt compounds would have been sent offsite. Therefore, cobalt compounds seem to have been used below the TRI otherwise use threshold of 10,000 lbs. This methodology confirms the previous calculation concerning cobalt (see above- list of chemicals used as catalyst) that the facility was below reporting threshold for cobalt compounds in 2010.

08066MBLLCBILLI	PAULSBORO REFINING CO LLC	2010	MOLYBDENUM TRIOXIDE	28458	FREEPORT	TX	GULF CHEMICAL AND METALLURGICAL FREEPORT

TRI Data Quality Questions (2010, 2009 and 2008)

2. **The following chemicals were chosen using a combination of Risk Screening Environmental Indicators software (RSEI 2007), 2010 TRI Total Releases Hazard Ranking and 2009/2010 largest increases reported in NJ.**

   Please provide thresholds, release and transfer (as well as treatment, recycling and energy recovery information) calculations for the following chemicals:
   a. **Benzene**
   b. **Nitrate compounds**
   c. **Hydrogen Cyanide**
   d. **Sulfuric acid**
   e. **PAC's**

   PRC Response: See Table 7.

   EPA Comment: The following sources of emissions for each chemical were provided (Attachment 5 - Table 7):
   - Process vents emissions
   - Heaters/boilers emissions
   - Tanks
   - WWTP
   - Fugitive Air Emissions
   - Drains
   - Cooling Tower
   - Discharges to Delaware River

   PRC provided a summary spreadsheet that covered the emissions sources for the calculations reported in TRI with pounds calculated. No individual spreadsheet for each chemical with specific calculations was provided. Review was based on this information and additional information provided under NEI when applicable.

   a. Benzene - Form R data reported that PRC manufactures the chemical and process it by using it as a reactant. Fugitive emissions reported in TRI are greater than stack emissions reported for 2010 (12,895 fugitive and 6,360 stack). However in previous years fugitive emissions were lower that stack emissions. Water emissions are low; however, they indicated that their water treatment consists of a phase separation, biological treatment, settling or clarification and chemical oxidation. The facility also indicates that they recycle onsite over 120,000 pounds and treat on-site over 10,000 pounds. For 2010 they reported a total production waste of 151,418 pounds out of 69

million pounds of benzene manufactured or 0.2% of the total amount was considered in TRI as production waste.

The TRI calculations provided for benzene show that the majority of air point source emissions are from tanks, and the majority of air fugitive emissions are from drains. The facility has a benzene recovery unit and in this area they have over 20 tanks for distillates/raffinates (Attachment 5- Appendix D, E) confirming large point source from tank emissions.

In PRC's response to our benzene air emission comparison with NEI reported data submitted for 2010 and 2009 (TRI 2009 air emissions: 15,426 lbs NEI 2009 air emissions: 7,288 lbs) it is indicated that the difference between NEI reported values and TRI reported values are due to the fact that NEI emissions cover sources of emissions from heaters, boilers, tanks and vents while TRI also include air emissions from WWTP and fugitive emissions. This holds true for 2009 and 2008 but not for 2010 when they report 0 emissions from WWTP. It seems that for 2010 they moved the point source air emission from WWTP to fugitive's emissions. To verify this we contacted Mr. Deemer on January 22, 2013 (Attachment 7 – e-mails) requesting that he provided and explanation for this change.

Mr. Demmer responded on February 1, 2013 and indicated that since 2010, the emissions for the WWTP have been reported as part of Sewers/Drains under Fugitive Emissions. This is associated with the methodology change on emission factors per USEPA's Emission Estimation Protocol for Petroleum Refineries (February 2011). He also indicated that the decrease in total emissions in 2011 is reflective of sampling results used as inputs for the water 9 modeling to estimate the WWTP emission.

EPA Recommendation: Facility provided a summary, we recommend that facility includes in the summary a more detail on assumptions and methodology used. In addition if changes to calculations methodologies are done it should be documented in this summary.

b. Nitrate Compounds - Nitrate compounds are manufactured by the facility at the WWTP. Table 7 (Attachment 5) indicates that they manufactured:
   - 400,648 pounds in 2008
   - 223,421 pounds in 2009
   - 335,052 pounds in 2010.

   Nitrate Compounds manufactured were discharged to the Delaware River.

   Facility did provide in (Attachment 5- Appendix L) the 2010. 2009 and 2008 Nitrate Compounds Calculation Details. In these documents they indicate that the calculations are based on monitoring results for Nitrate-N and that it was converted to nitrate (NO_3) for TRI reporting. Effluent and influent concentrations for nitrates at the WWTP are calculated to determine if threshold is exceeded. Effluent calculations are reported for water emissions based on monthly composites.

   When the facility was Valero Refining ("VR") it reported that they emitted 90,469 lbs of nitrate compounds in 2008 and 50,450 lbs of nitrate compounds in 2009, Based on the

information provided by PRC, VR should have reported that they emitted 400,648 lbs in 2008 and 223,421lbs in 2009. PR indicates in the their response that in 2009 and previous years the nitrate compound releases via the WWTP were calculated and reported as nitrogen (molecular weight of 14) vs. nitrate (a molecular weight of 62).

Please see below Question #3 response for increase: nitrate compounds.

Year	Nitrate Compounds TRI Reported Emissions (lbs)	Nitrate Compounds TRI Correct Emissions (lbs)
2008	90,469	400,648
2009	50,450	223,421
2010	335,052	333,052

EPA Request: EPA requested during the inspection that PRC corrected Forms R for 2008 and 2009 as they had VR data available to correct Form R reports. TRI Form R reports were revised by PRC (see Attachment 6).

c. Hydrogen Cyanide - This chemical is generated in their FCCU process. Facility reported the manufacturing of 225,910 pounds in 2010, 263,316 pounds in 2009 and 296,038 pounds in 2008. All emissions were from the process vents directly to the air which is a stack emission. No fugitive emissions were reported.

On October 4, 2012 we e-mailed Mr. Deemer a request (Attachment 7-emails) for additional information on hydrogen cyanide. On December 6, 2012 we received a response (Attachment 6) indicating that hydrogen cyanide is coincidentally manufactured in the Regenerator of the FCC unit and it is emitted from the stack after passing through the Wet Gas Scrubber. PRC

EPA Recommendation: Facility provided a summary, we recommend that facility includes in the summary a more detail on assumptions and methodology used. In addition if changes to calculations methodologies are done it should be documented in this summary. In addition facility did not indicate in Form R Section 7 On-Site Waste Treatment Methods and Efficiency that this stream passes through a Wet Scrubber. If the wet scrubber is reducing the hydrogen cyanide emissions the facility should include it in this section of Form R.

d. Sulfuric Acid - Table 7 (Attachment 5) indicates that they manufactured 27,372 pounds in 2008; 29,642 pounds in 2009 and 33,135 pounds in 2010. Majority of the releases are from the process vents (>90%) and the other source is from heaters and boilers. On October 4, 2012 we e-mailed Mr. Deemer a request (Attachment 7-emails) for additional information on sulfuric acid as per Question 5 (below). On December 6, 2012 we received a response (Attachment 6) indicating that sulfuric acid is a product of combustion based on the contents of the refinery fuel gas, and resultants of refining processed based on the makeup of the crude oil. PRC indicated that aerosol forms of these chemicals are released to the atmosphere from process heaters, boilers and WGS stack.

e. PAC's - Table 7 (Attachment 5) indicates that PAC's are mainly processed at the facility. In 2010 they processed 3.0 million pounds, in 2009 they processed 2.8 million

pounds and in 2008 they processed 3.4 million pounds. Releases are mainly from process vents, heaters and boilers. No fugitive emissions were reported.

In *Locating & Estimating Air Emissions from Sources of Polycyclic Organic Matter,* EPA-454/R-98-014 contains PAC emission factors for seven PAC chemicals in the PAC category (benz(a)anthracene, benzo(a)phenanthrene (chrysene), benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene). Using Table 4.5 the number estimated emissions calculated would be much higher, however it is an uncontrolled estimate. TRI 2011 information comparing PACs emissions nationwide indicate that the reported releases are within what a large number of petroleum refineries report.

Velu Senthil in OEI TRI program and in charge of guidance was contacted and he indicated that the above reference was probably outdated as he had the latest OAQPS testing data for petroleum refineries which the majority indicated that they were Non-Detect.

3. **Increases of Chemical Emissions:**
Please provide explanations for the increases in emissions when comparing 2009 vs. 2010 for the following chemicals:

Chemical	2009 Total Releases	2009-2010 Change	2010 Total Releases
NITRATE COMPOUNDS	50450	284602	335052
XYLENE (MIXED ISOMERS)	23046	34061	57107
TOLUENE	29198	22782	51980
N-HEXANE	27340	9302	36642
ETHYLBENZENE	7194	7621	14815
NAPHTHALENE	4478	5136	9614

PRC Response: Reasons for increases were provided (see Attachment 5). The following details reasons for increases:

Nitrate compounds – PRC indicated that increase was due to the use of the wrong molecular weight. PRC used molecular weight of nitrogen (14) vs. nitrate (62). This error accounted for an underestimation of the reported emissions of 84%. Facility was requested to revise data for 2009 and 2008 (see above Question 2 b.) The following summarizes this information reported vs. information that should have been reported:

Year	Nitrate Compounds TRI Reported Emissions (lbs)	Nitrate Compounds TRI Correct Emissions (lbs)
2008	90,469	400,648
2009	50,450	223,421
2010	335,052	333,052

Xylenes, Toluene, N-hexane and Ethylbenze – PRC indicated changes in calculation methods in total fugitive emissions to air as well as variation of annual thorough put was the reason of why there was increase from 2009 to 2010. In 2009 calculations were based on

total fugitive VOC's for 2009 and ratios established in 2000 between individual VOCs and total VOCs. In 2010 the fugitive VOCs were calculated based on the emission factors using EPA's Emission Estimating Protocol for Refineries February 2011 per a 2011 EPA ICR. A copy of the ICR was provided (see Attachment 5, Appendix H).

Naphthalene – PRC indicated changes in calculation methods for 2010. They previously used to calculate fugitive emissions based on total fugitive VOC's for 2009 and an average fugitive emission concentration of 1.9% for naphthalene established by Valero. In 2010 the fugitive VOCs were calculated based on the emission factors using EPA's Emission Estimating Protocol for Refineries February 2011 per a 2011 EPA ICR. A copy of the ICR was provided (see Attachment 5, Appendix H).

4. **Chemicals reported one year vs. other years:**
Please provide explanation of why carbonyl sulfide and cobalt compounds were not reported in 2010, and why ethylene glycol and hydrochloric acid (aerosol) were not reported in 2009 and 2008.

Chemical	2008 Total Releases	2009 Total Releases	2010 Total Releases
CARBONYL SULFIDE	2348	1257	
COBALT COMPOUNDS	0	41	
ETHYLENE GLYCOL			0
HYDROCHLORIC ACID (1995 AND AFTER ACID AEROSOLS ONLY)			888

PRC Response: Carbonyl sulfide (COS) emission calculations are based on COS emissions at Tail Gas unit 80 and 81 and a removal efficiency of 95%. Before 2010, they calculated this number based on the CEMS monitoring data for Total Reduced Sulfur. In 2010 they used Valero's ValAir air emission inventory program. Attachment 5 Apendix I shows that in 2010 facility was under the TRI reporting threshold. Stack and fugitive emissions would have been 2,818 pounds and 10,279 was destroyed through onsite treatment.

EPA Comment: On October 4, 2012 we e-mailed Mr. Deemer a request (Attachment 7-emails) for additional information on why they went from a monitored data to a non- monitored. On December 6, 2012 we received a response (Attachment 6) indicating that they used the ValAir emission inventory because the data was consistent with information reported for the NJDEP Annual Emission Statement for 2010. However, for RY2011 PRC elected to use CEMS monitored data based on the fact that the CEMS data had been used for the NJDEP annual emission inventory for 2011.

5. **Air Fugitive emissions vs. Stack Emission :**
Please explain reported fugitive emissions for the following:

Chemical	Year	Total Air Releases	Fugitive Air Emissions	Point Source Air Emissions
HYDROGEN CYANIDE	2008	296038	0	296038
HYDROGEN CYANIDE	2009	262798	0	262798
HYDROGEN CYANIDE	2010	230125	0	230125
AMMONIA	2010	17172	0	17172
AMMONIA	2009	15110	0	15110
AMMONIA	2008	7634	0	7634
LEAD COMPOUNDS	2010	71	0	71
LEAD COMPOUNDS	2008	69	0	69
LEAD COMPOUNDS	2009	61	0	61
MERCURY COMPOUNDS	2008	10	0	10
MERCURY COMPOUNDS	2010	7.3	0	7.3
MERCURY COMPOUNDS	2009	6	0	6
SULFURIC ACID (1994 AND AFTER ACID AEROSOLS ONLY)	2010	33135	0	33135
SULFURIC ACID (1994 AND AFTER ACID AEROSOLS ONLY)	2009	29635	0	29635
SULFURIC ACID (1994 AND AFTER ACID AEROSOLS ONLY)	2008	27619	0	27619

PRC Response: These chemicals are not believed to be released as fugitive air emissions at the PRC facility.

EPA Comment: On October 4, 2012 we e-mailed Mr. Deemer a request (Attachment 7-emails) for additional information on the PRC TRI reporting 0 fugitive emissions. On December 6, 2012 we received a response (Attachment 6) that indicated that:

- Hydrogen cyanide is coincidentally manufactured in the regenerator of the FCC unit and emitted from the stack after passing through the Wet Gas Scrubber (WGS) and therefore they have no knowledge that there are other emissions prior to the stack.
- Ammonia is coincidentally produced in the refining process including sour water stripping, fuel combustion and wastewater treatment. Aerosol ammonia is released to the atmosphere at the WGS stack and heaters and boilers. They indicate they have no knowledge of fugitive emissions for ammonia.
- Lead Mercury and sulfuric acid are products of combustion and aerosol of these chemicals are released to the atmosphere from process heaters, boilers and the WGS stack.

Based on the information assumption is considered reasonable for the above fugitive emissions.

Comparison of NEI Air emissions to TRI

6. **The 2009 NEI report when compared to TRI 2009 show the following. Please explain difference.**

Pollutant Name	Total Emissions		TRI Air Emissions	
Benzene	7,288.54	Lbs	15,426	Lbs
Ammonia	6.14	Ton	7.55	Tons

Please explain difference.

PRC Response: Attachment 5.

Benzene: Difference in reported benzene emission is due to additional emissions included in the 2009 TRI report. NEI emissions (7,289lbs) encompass point source emissions from the heaters, boilers, tanks and vents. TRI emissions (15,426) included additional emission sources from WWTP (6,411lbs) and fugitive emissions.

EPA Comment: Upon reviewing data provided it was noticed that noticed that in 2010 benzene in the TRI calculation summary was reported as zero air emissions coming from the WWTP. However in previous years there were releases from the WWTP which agree with statement above. (Attachment 5; Table 7) A review of the past 5 years of TRI data comparing fugitives to stacks show the following for benzene:

Name	Year	5.1 Fugitive Air Em	5.2 Point Source Air
PAULSBORO REFINING CO LLC	2007	3336	7516
PAULSBORO REFINING CO LLC	2008	2699	11341
PAULSBORO REFINING CO LLC	2009	1726	13700
PAULSBORO REFINING CO LLC	2010	12894	6360
PAULSBORO REFINING CO LLC	2011	5048	1537

The table above shows that from 2007 - 2009 point source emissions are higher than fugitives. But starting in 2010 fugitives are shown as higher that point sources. On January 22, 2013 we sent an e-mail to Mr. Deemer requesting and explanation (Attachment 7- emails). PRC responded on February 1, 2013 indicating that the change was due to a methodology change in emission factors USEPA's Emission Estimation Protocol for Petroleum Refineries dated February 2011. Below is a table that shows the benzene air releases provided by Mr. Deemer for 2010 and 2011.

	Onsite Air Releases (All units are in pounds)									
Chemical	Process Vents	Heaters/ Boilers	Tanks	WWTP	Total Point Source Air Releases	Fugitives	Sewers/ Drains	Cooling Tower	Total Fugitive Air Releases	Total Air Releases
Benzene 2011	253	46	1,238	Included in Sewers/Drains	1,537	2,370	2,678	0	5,048	6,585
Benzene 2010	10	1,343	5,007	Included in Sewers/Drains	6,360	2,615	10,280	0	12,895	19,255
Benzene 2009	15	1,249	6,027	6,409	13,700	257	899	570	1,726	15,426
Benzene 2008	1,533	4,963	640	4,205	11,341	236	1,893	570	2,699	14,040
Benzene 2007	1,533	5,082	883	18	7,516	355	2,411	570	3,336	10,852

PRC seems to have accounted for all the sources of air emissions, but in 2009, 2008 and 2007 the fugitive emissions from the WWTP sewers/drains were accounted as point source. In 2010 and 2011 they are accounted as fugitive emissions as per the new estimation protocol. This change provides a more accurate representation of the type of emissions to air (fugitive vs. stack).

7. **The 2010 NJDEP NEI report (page 4 of 710) when compared to TRI 2010 shows the following. Please explain difference**

Pollutant Name	Total Emissions		TRI Air Emissions	
Benzene	14,367.86	Lbs	17,172	Lbs

PRC Response: Difference in reported benzene emission is due additional emissions included in the 2010 TRI report. NEI emissions (14,368 lbs) encompass point source emissions from the heaters, boilers, tanks and vents. TRI emissions (19,254 lbs) included additional emission sources from WWTP (6,411lbs) and fugitive emissions.

EPA Comment: See above EPA comment question 6.

Comparison of Water vs. TRI

8. **Presently, your NPDES permit only includes Nitrogen, Ammonia Total (as N) and Chromium, hexavalent (as Cr) for the regulated list of TRI chemicals. Facility did file for ammonia but did not file for Chromium or chromium compounds. Please explain.**

Chemical	Year	Surface Water Discharges
AMMONIA	2008	4604
AMMONIA	2009	5242
AMMONIA	2010	5339

PRC Response: Chromium has not been used as a cooling water treatment chemical at Paulsboro since the 1970's. Chromium is present at low levels at PRC. DMR reports for the past 12 months average 0.07 kg/day and 0.09 kg/day. Total 2010 annual releases of hexavalent chromioum are 56 to 72 lbs. from WWTP (Attachment 5)

EPA Comments: Based on the above information facility does meet reporting requirements for chromium.

9. **As of August 2011 the Delaware River Commission under Resolution 2010-5 has a new Nutrient Monitoring Requirement in which your facility is required to monitor monthly (24 hour composite) for nitrates, nitrites and ammonia. Please explain how the sampling results will be used in your reporting requirements for RY 2011, which is due this July 1, 2012.**

PRC Response: DRBC nutrient monitoring requires PRC to monitor for ammonia, nitrite, nitrate and aqueous phosphorus on a monthly basis. PRC noted that ammonia and nitrate is

monitored frequently as part of compliance requirements for the WWTP. They point out that nitrite and non elemental phosphorus are not TRI chemicals. PRC provided calculations details for nitrate compounds (Attachment 5)

EPA Comment: Sodium nitrite is a listed TRI chemical, however we do not know if this is the type of "nitrite" that PRC is monitoring for. There is presently no indication that they exceed levels of sodium nitrite. We will inform Mr. Deemer.

RCRA vs. TRI

10. Facility BRS report for 2009 indicates the following. Please indicate how these wastes are tracked and used to report in TRI.

Waste Desc. (1st 30 chars)	Facility Name	State	Tons Generated	Tons Generated and Managed
CLARIFIED SLURRY OIL TANK BOTT	VALERO REFINING COMPANY NEW JERSEY	NJ	2,764	2,764
API SPERATOR SOLIDS/SLUDGE	VALERO REFINING COMPANY NEW JERSEY	NJ	25	25
PROCESS SEWER SOLIDS	VALERO REFINING COMPANY NEW JERSEY	NJ	23	23
SPENT SANDBLAST MEDIA & DEBRIS	VALERO REFINING COMPANY NEW JERSEY	NJ	16	16
CONTAMINATED PPE AND DEBRIS	VALERO REFINING COMPANY NEW JERSEY	NJ	13	13
CLARIFIED SLURRY OIL TANK DEBR	VALERO REFINING COMPANY NEW JERSEY	NJ	12	12
REFINERY SEWER PIPES	VALERO REFINING COMPANY NEW JERSEY	NJ	12	12
HEAT EXCHANG SOLIDS/PPE/DEB	VALERO REFINING COMPANY NEW JERSEY	NJ	10	10
REFINERY HAZARDOUS WASTE FROM	VALERO REFINING COMPANY NEW JERSEY	NJ	10	10

PRC Response: PRC calculates off-site transfers based on the waste volumes and concentrations of these chemicals in the waste streams. Calculations are based on the waste volumes and concentration of chemicals in the waste streams and the quantity in the stream. If multiple streams contain the same TRI chemical are sent to a disposal facility, the total quantities of this chemical to the disposal facility are the sum of the quantity from each stream. PRC provided the 2011 RCRA Biennial Report (Attachment 5).

EPA Comment: The 2011 RCRA Biennial Report was reviewed. For 2011 the majority of the wastes were for hazardous waste from various activities (859,560 lbs); spent sandblast media (89,220 lbs); corrosive hazardous waste (61,500 lbs); tank bottoms (740,860 lbs) and spent hydrotreating catalysis contaminated debris (995,847 lbs). The information obtained in RTKNET.ORG for RCRA BRS reports show the following wastes:

Waste Description (1st 30 chars)	Facility Name	State	Tons Generated
SPENT HYDROTREATING CATALYSTS	PAULSBORO REFINING COMPANY LLC	NJ	497.924
HAZARDOUS WASTES FROM VARIOUS	PAULSBORO REFINING COMPANY LLC	NJ	429.78
MAIN COLUMN TANK BOTTOMS	PAULSBORO REFINING COMPANY LLC	NJ	370.43
SPENT SANDBLAST MEDIA	PAULSBORO REFINING COMPANY LLC	NJ	44.61
CORROSIVE HAZARDOUS WASTE	PAULSBORO REFINING COMPANY LLC	NJ	30.75

TRI shows that the following top TRI chemicals in pounds were transferred on 2011:

Chemical	Total Transfers Off-site for Further Waste Management	Transfers to Recycling	Transfers Off-Site for Disposal or Other Releases
MOLYBDENUM TRIOXIDE	63150	63150	0
COBALT COMPOUNDS	15208	15208	0
NICKEL COMPOUNDS	7558	6548	1010
VANADIUM COMPOUNDS	2196	0	2196

The above TRI transfers are metal compounds that are usually contained in the catalysts used by petroleum refineries. The top waste generated by PRC is the spent catalysts confirming that data provided TRI is reflective to RCRA hazardous waste generated. Differences in quantities are usually due to the fact that TRI is chemical specific while RCRA hazardous waste is not.

EPA Final Findings:

The following are the final findings of this inspection:

- PRC seemed to have reported TRI reports for chemicals stored at the facility.
- PRC provided reasonable responses to increases and decreases of emissions for the chemicals in above questions **except for nitrate compounds:**
    - PRC manufactures nitrate compounds at the WWTP.
    - Table 7 (Attachment 5) indicates that the facility manufactured: 400,648 pounds in 2008, 223,421 pounds in 2009, 335,052 pounds in 2010.
    - Valero Refining ("VR") reported that they emitted 90,469 lbs of nitrate compounds in 2008 and 50,450 lbs of nitrate compounds in 2009.
    - PRC indicates in the their response that in 2009 and previous years the nitrate compound releases via the WWTP were calculated and reported as nitrogen (molecular weight of 14) vs., nitrate (a molecular weight of 62).
    - Based on the information provided by PRC, VR should have reported that they emitted 400,648 lbs in 2008 and 223,421lbs in 2009.

- PRC had knowledge of this error but did not correct emissions reported for 2008 and 2009.
- Correct TRI emissions calculated should have been as follows.

Year	Nitrate Compounds TRI Reported Emissions (lbs)	Nitrate Compounds TRI Correct Emissions (lbs)
2008	**90,469**	**400,648**
2009	**50,450**	**223,421**
2010	**335,052**	**333,052**

- PRC revised TRI data for 2008 and 2009 to reflect correct emissions.
- VR or PRC should have corrected 2008 or 2009 previous Form R emissions for nitrate compounds.

- Recommendation: PRC should keep track of changes in estimations techniques within the different spreadsheets used to calculate TRI Releases.

ATTACHMENTS:

1. Confirmation Letter and Questionnaire
2. EPA Notice of Inspection and Receipt of samples
3. Refinery Process and Associated Processes

3.1 PRC Environmental Agreement

4. NJ DEP Community Right to Know Survey 2011
5. PRC Response to Questionnaire
6. PRC Response to Additional Questions
7. PRC-EPA E-mails